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Videodensitometric time-density curve change after alcohol septal ablation of obstructive hypertrophic cardiomyopathy

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Abstract A recently developed computerized method for estimation of myocardial perfusion, based on the analysis of the time-density curves, is demonstrated to assess myocardial blush over a selected myocardial region of interest in a patient with obstructive hypertrophic cardiomyopathy before and after alcohol septal ablation.

Keywords Blush · Obstructive hypertrophic cardiomyopathy · Percutenous transluminal septal myocardial ablation · Videodensitometry

A 35-year-old female patient with obstructive hypertrophic cardiomyopathy (HOCM), causing New York Heart Association Class III symptoms, underwent alcohol septal ablation [1, 2]. Before and after ablation, coronary angiograms were recorded on the left anterior descendent artery, and subsequently phase-matched digital subtraction angiograms have been performed on the recordings off-line. The recently developed computerized method for estimation of myocardial perfusion, based on the analysis of the time-density curves (TDC), was used to assess myocardial blush over a selected myocardial region of interest representing the area supplied by the ablated septal branch [3–5]. The ratio of G_{max} (defined as maximal amplitude of the TDC) and T_{max} (defined as the time to reach G_{max}) was reduced after alcohol ablation compared with pre-procedural levels indicating reduced perfusion in the ablated septal area (Fig. 1). This new method may allow evaluation of myocardial perfusion parameters, and may assist to judge the success of alcohol ablation in HOCM.

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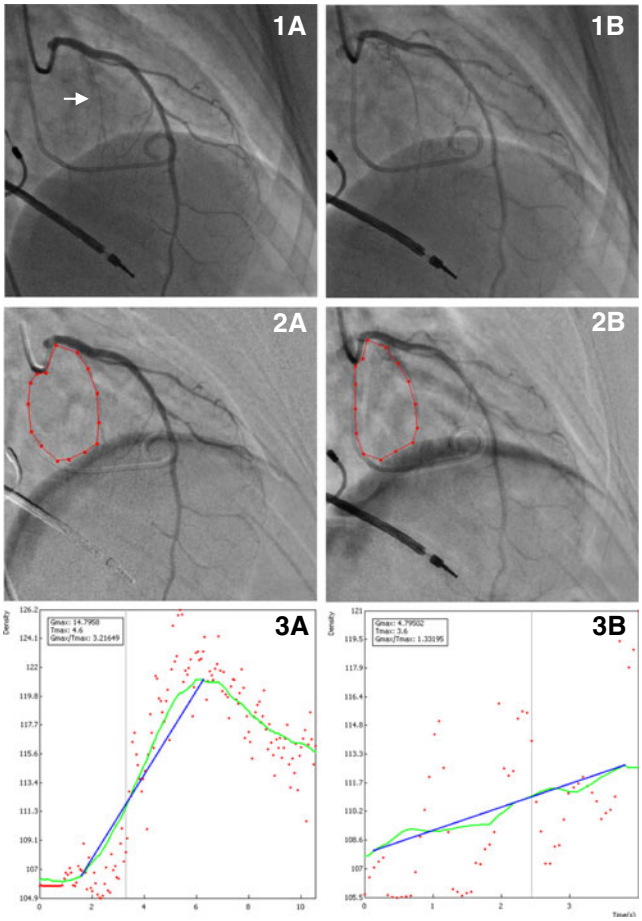

Fig. 1 Digital subtraction angiographic and videodensitometric changes after alcohol ablation in obstructive hypertrophic cardiomyopathy. Insert 1. Coronary angiographic images of the left anterior descending coronary artery shown from the cranial-right anterior oblique orientation in an HOCM patient before (1A) and after (1B) alcohol ablation. *Arrow* indicates a sub-branch of the first septal perforator artery which was ablated during the procedure. The absence of the branch is evident on the post-procedure angiogram (1B). Insert 2. Digital subtraction angiographic images shown from the same orientation as Insert 1, before (2A) and after (2B) alcohol ablation. The region of interest (ROI), *encircled in red*, represents the area supplied by the ablated branch. Myocardial blush is represented by *greyish* opacification of the microvasculature, which is seemingly reduced after ablation (2B). Insert 3. Time-density curves based on videodensitometric evaluation of density in the region of interest from Insert 2 indicating myocardial perfusion before (3A) and after (3B) alcohol ablation. The rise and fall of density (y axis) as a function of time (x axis) is represented by a *green curve* (time-density curve, TDC). The maximal amplitude of TDC is defined as G_{max}, while the time to reach G_{max} is defined as T_{max}. Both values were automatically computed and their ratio (G_{max}/T_{max}) was used as a parameter of myocardial perfusion changes. The ratio of G_{max}/T_{max} was reduced after alcohol ablation compared with pre-procedural levels (3.21 vs. 1.33) indicating reduced perfusion in the ablated septal area

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